

PENNSYLVANIA RAILROAD, DELAWARE RIVER BRIDGE  
Pennsylvania Historic Railroad Bridges Recording Project  
Spanning Delaware River, south of U.S. Rt. 1  
Morrisville  
Bucks County  
Pennsylvania

HAER No. PA-512

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PA  
9-MORVI,  
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
1849 C Street, NW  
Washington, DC 20240

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HISTORIC AMERICAN ENGINEERING RECORD  
PENNSYLVANIA RAILROAD, DELAWARE RIVER BRIDGE

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**Location:** Spanning Delaware River, south of U.S. Rt. 1, between Morrisville, Bucks County, Pennsylvania, and Trenton, Mercer County, New Jersey.

**USGS Quadrangle:** Trenton West, New Jersey-Pennsylvania (7.5-minute series).

**UTM Coordinates:** 18/519800/4450655

**Dates of Construction:** 1901-03.

**Basis for Dating:** Secondary sources.

**Designers:** William H. Brown, Chief Engineer; William A. Pratt, Assistant Chief Engineer; James F. Cullen, Assistant Engineer (Pennsylvania Railroad).

**Builder:** Charles A. Sims & Co. (Philadelphia).

**Present Owner:** National Railroad Passenger Corporation (Amtrak).

**Present Use:** Railroad bridge.

**Structure Type:** Stone arch.

**Significance:** The Delaware River crossing at Trenton is a critical link in the railroad route from Philadelphia to New York, and has hosted a series of bridges dating back to 1806. The current bridge is one of the Pennsylvania Railroad's largest stone arch structures, built during a campaign of major improvements at the turn of the twentieth century.

**Historian:** Justin M. Spivey, April 2000.

**Project Information:** The Historic American Engineering Record (HAER) conducted the Pennsylvania Historic Railroad Bridges Recording Project during 1999 and 2000, under the direction of Eric N. DeLony, Chief. The project was supported by the Consolidated Rail Corporation (Conrail) and a grant from the Pennsylvania Historical and

Museum Commission (PHMC). Justin M. Spivey, HAER engineer, researched and wrote the final reports. Preston M. Thayer, historian, Fredericksburg, Virginia, conducted preliminary research under contract. Jet Lowe, HAER photographer, and Joseph E. B. Elliott, contract photographer, Sellersville, Pennsylvania, produced large-format photographs.

### Description and History

The Delaware River crossing at Trenton is a historically important one because it lies along a direct route between Philadelphia and New York.<sup>1</sup> The connection of those two cities by rail was an early goal of the Philadelphia & Trenton Railroad (P&T), which, along with the Camden & Amboy Railroad, began offering through service to New York in 1840. The P&T, chartered in 1832, completed its line in 1834. In order to cross the Delaware River, the railroad had acquired stock in the Trenton Delaware Bridge Company, sometimes known by its full name, "The President, Managers and Company for Erecting a Bridge over the Delaware at or near Trenton."<sup>2</sup> The P&T then laid tracks across the wooden toll bridge constructed by the company in 1806.

The 1806 structure, on the site presently occupied by the Lower Trenton (Bridge Street) Bridge, had five Burr arch-truss spans totaling 1,008'-0" in length.<sup>3</sup> Because it was not designed for railroad traffic, horses hauled rail cars across the bridge until it was reinforced to carry locomotives in 1835. Trains and carriages shared the 11'-0" wide south roadway until 1848, when it was widened to 16'-0" with a separate lane for each.<sup>4</sup> Given that steam locomotives had caused at least one major fire on the wooden bridge, and that rail traffic was increasing, it became clear that the railroad needed a separate bridge. Pennsylvania and New Jersey state legislatures granted permission in 1868 for a parallel railroad bridge on southward extensions of the existing stone piers.<sup>5</sup>

This right would not be exercised for another seven years, and then, not by the P&T. A new iron bridge would be constructed under purview of the Pennsylvania Railroad (PRR), which in the meantime had been making moves toward control of the Philadelphia-New York route. From 1863 to 1867, the PRR oversaw construction of the Connecting Railway in Philadelphia, a link across the Schuylkill River between its main line and the P&T. The Connecting Railway was initially leased to the P&T, then an independent company. In December 1871, however, the PRR acquired the P&T by lease.<sup>6</sup> Along with a direct route to New York, the PRR also picked up the P&T's share in the toll bridge over the Delaware.

All subsequent bridges over the Delaware at Trenton, therefore, were PRR structures. First came two-track iron through truss spans, which began carrying rail traffic in 1875. The wooden bridge, thereafter carrying vehicular traffic, was rebuilt in iron the following year. In 1892 the piers were extended southward once more, to accommodate two more tracks on iron through truss spans. Six years later, the PRR replaced the 1875 iron spans with steel, at which point three parallel bridges of different ages shared the piers. The 1876 vehicular spans lasted

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until 1928, when the Delaware River Joint Toll Bridge Commission replaced them with steel.<sup>7</sup> When the present stone bridge was completed, the 1892 iron spans and 1898 steel spans were sold to the Philadelphia, Baltimore & Washington Railroad and re-erected in 1904 as part of the Long Bridge over the Potomac River at Washington, D.C. The spans saw forty more years of service in that location before being scrapped.<sup>8</sup>

Completion of the PRR's stone bridge at Trenton would mark the end of trackage rights on the Bridge Street structure. When pressed by the city of Trenton to eliminate grade crossings, the PRR chose to build a new structure on a different alignment about a hundred feet to the south, straightening a sharp S-curve while raising tracks above city streets. In 1901, the railroad began construction on the new Delaware River bridge and a sister structure over the Raritan at New Brunswick. Both bridges were stone, reported *Engineering News*, "in accordance with [the PRR's] well-known policy of replacing steel bridges, when the conditions are favorable, with masonry arch structures."<sup>9</sup> Chief Engineer William H. Brown preferred stone because of its relative permanence and low maintenance as compared to steel. Given the company's financial successes during the early twentieth century, the higher cost of stone seems to have been little deterrent. Brown, whose record-setting Rockville Bridge north of Harrisburg had made that policy well-known, went a step further at Trenton by specifying stone backing instead of the concrete used at Rockville.

Construction began on the Morrisville abutment in October 1901, and as the 1902 date stone (near the Trenton end) indicates, was intended to take about a year. Unexpectedly deep bedrock, however, delayed foundation work. A series of floods during the winters of 1901 and 1902 slowed progress further. One particularly bad flood on 30 September 1902 rose suddenly enough to destroy a temporary trestle constructed by contractor Charles A. Sims and Company of Philadelphia, carrying off four rail cars with it.<sup>10</sup> As a result of these complications, the bridge was not completed until 1903.

Eighteen 60'-0" segmental arch spans, with a skew of 71.5 degrees, carry four tracks across the Delaware River. Morrisville's Mill Street runs beneath the southernmost span. The structure required about 45,000 cubic yards of Clearfield sandstone. To avoid the formidable geometry of a truly skewed arch barrel, PRR engineers achieved a "false" skew with twelve arch ribs tied together by iron clamps at the crown. Each of the ribs, while perpendicular to the bridge, is slightly offset from its neighbor, forming a stepped approximation of the skew angle.<sup>11</sup> The arch rings are 3'-3" thick and 4'-4" wide, resulting in a total width of 52'-0". Each pier is 8'-0" wide at the springing line, except for two 22'-0"-wide piers, which occur at one-third points along the bridge.<sup>12</sup> Thus, while the bridge's even number of spans violates classical rules of symmetry, the wide piers create three visual groupings to restore balance. This attractive structure remains a landmark on the Morrisville and Trenton riverfronts today. It now carries passenger trains on Amtrak's Northeast Corridor, and commuter trains on the Southeastern Pennsylvania Transportation Authority's R7 route.

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## Notes

1. An article in *Railway Age* describing the 1903 stone bridge began — atypically for this trade journal — “Since the night of December 25, 1776, when Washington made his famous crossing of the Delaware at Trenton....” See “The Delaware River Bridge of the Pennsylvania Railroad at Trenton, N.J.,” *Railway Age* 35, No. 12 (20 Mar. 1903): 467.
2. James J. D. Lynch, Jr., “Trenton Delaware Bridge,” *Keystone* 15, No. 4 (Dec. 1982): 25.
3. Fred J. Moll, “Covered Railroad Bridges of Pennsylvania,” 3. Typescript in file: Bridges - Misc., Box 13, Research Files, Railroad Museum of Pennsylvania, Pennsylvania Historical and Museum Commission, Strasburg, Pa.
4. Delaware River Joint Toll Bridge Commission, “Lower Trenton Non-Toll Bridge (Structure No. 40),” in *General Information on the Nan-Tall Bridges* (Morrisville, Pa.: Delaware River Joint Toll Bridge Commission, 1995), LT-3.
5. Lynch, “Trenton Delaware Bridge,” 25.
6. Howard W. Schotter, *The Growth and Development of the Pennsylvania Railroad Company: A Review of the Charter and Annual Reports of the Pennsylvania Railroad Company 1846 to 1926* (Philadelphia: Press of Allen, Lane, and Scott, 1927), 61, 75, 97-98.
7. Coverdale & Colpitts, Consulting Engineers, *The Pennsylvania Railroad Company, Description of Important Bridges and Stations* (New York, 1945), 6,7. Located in file: PRR Office of Secretary, Studies by Consultants and Published Reference Materials, 1855-1958, Box 1, Penn Central Railroad Records, Manuscript Group 286, Pennsylvania State Archives, Harrisburg, Pa.
8. “Ingenuity Marks Bridge Renewal,” *Railway Age* 118, No. 3 (20 Jan. 1945): 187-90, describes moving spans to Washington, D.C. See also U.S. Department of the Interior, HAER No. DC-50, “Long Bridge,” n.d., Prints and Photographs Division, Library of Congress, Washington, D.C.
9. “Masonry Arch Bridges at Trenton and New Brunswick, New Jersey; Pennsylvania R. R.,” *Engineering News* 47, No. 5 (30 Jan. 1902): 86-7.
10. F. P. Abercrombie to Charles A. Sims and Company, 26 Sep. 1904. Located in file: Trenton, N.J. - Delaware River Bridge 1890-1904, Box 1461, Chief Engineer, Engineering Department, Pennsylvania Railroad Company records, Acc. 1807, Hagley Museum and Library, Greenville, Del. The railroad billed Sims for the lost cars. Subsequent letters detail internal wrangling over whether this was justified, and the bill canceled within a month.
11. Benjamin H. Latrobe is credited with introducing the “false skew” concept to the U.S. at the turn of the nineteenth century, and it has since been used on a number of stone arch bridges in Pennsylvania. See J. Dutton Steele, “On Skew Bridges, and on the Construction of Falls Skew Bridge over the Schuylkill, near Philadelphia,” *Transactions of the American Society of Civil Engineers* 1 (1870): 209-13, cited in U.S. Department of the Interior, addendum to HAER No. PA-39, “Philadelphia & Reading Railroad, Schuylkill River Viaduct,” 2000, Prints and Photographs Division, Library of Congress, Washington, D.C.
12. Corbeled stone balconies above the wider piers provide safety niches for track workers. Modern standards require safety niches at more frequent intervals, for which cantilevered steel balconies have been added.

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**Additional Sources**

1. U.S. Department of the Interior, HAER No. PA-71, "Northeast Railroad Corridor," 1977, Prints and Photographs Division, Library of Congress, Washington, D.C. See photographs PA-71-29 through PA-71-32 for aerial coverage of the Delaware River Bridge.
2. National Railroad Passenger Corporation (Amtrak) archives, Philadelphia, Pa.
3. Interstate Commerce Commission, Bureau of Valuation, Engineering Field Notes, Philadelphia & Trenton Railroad (Jun. 1916), Box 5937, Record Group 134, National Archives, College Park, Md.